

What Is Claimed Is:

1. A wheelchair with at least a pair of rear drive wheels arranged in left and right chair frame sections and a pair of driven wheels arranged in the left and right chair frame sections for enabling forward and reverse driving and steering of the wheelchair, wherein the improvement comprises:

at least one pair of forced driven caterpillars functioning as front wheels and supporting a front section of a chair body on the ground, which having a plurality of cylindrical wheels (146, 147 and 148) with rotary shafts in their central portions and grooves in their peripheries so that at least one flexible belt (149) is wound around the wheels, wherein the belt is in contact with the wheels to define linear sections between adjacent ones of the wheels so that the linear sections define a plurality of sides of at least a triangle, one of two sides having an obtuse exterior angle there between being parallel with the ground side and the other one being defined the frontmost wheel forms an approach angle with respect to the ground, and wherein at least one of the wheels is provided means being driven by transmitted force, and means for coupling the wheels to a front section of the chair frame, thereby readily driving over obstacles or depressions on a road.

2. An improved wheelchair as recited in claim 1, in which further comprises:

at least one caster wheel which is provided with control means of lifting up and down against chair body mounted on the front section of the chair body, and is provided coincidentally with the caterpillars which recited in claim 1 so that the caster wheel and the caterpillars selectively contact the ground to facilitate turning and climbing, wherein the caster and the rear wheels support the wheelchair on the ground in a rolling fashion.

3. An improved wheelchair as recited in claim 1, in which further comprises:

an auxiliary power source for driving the caterpillars which

are arranged in the front section of the chair body; and

steering means for at least pair of the rear wheels which are arranged in a rear section of the chair body.

5           4. A foldable wheelchair body frame for use in a seat, in which further comprises:

          a X-shaped frame structure for an auxiliary wheel which is constituted with two rod members of equal length and coupled each other with hinge means at their middle portions;

10           two rod members of equal length having hinge means at both ends hinged with each other to define an L-shaped structure and the other ends are coupled with the hinge means on the X-shaped frame structure between the cross point and ends of the X-shaped frame to provide at least a set of symmetric quadrangular linkages having four sides  
15           connected via four joints;

          means for coupling the ends of the rod members of the X-shaped frame structure with left and right upper portions of the body frame rotatably, wherein the other ends of the X-shaped frame structure contact lower portions of the body frame to support the same; and

20           means for vertically supporting a steering shaft of the auxiliary wheel on the X cross point and the L cross point.

5. A wheel chair caster wheel with vertical shaft for steering, in which further comprises:

25           a knuckle cylinder of an elongated cylinder body for supporting the caster on a chair body and having a cylindrical elastic member and surrounding the ball-retaining cylinder, wherein the hollow washers contact and support both ends of the elongated cylinder, a ball-retaining cylinder having a cylindrical wall and a plurality  
30           of steel balls inserted into the cylindrical wall, both ends of the ball-retaining cylinder being supported by hollow washers and rolling bearings, wherein the ball-retaining cylinder is placed around the steering shaft;

          a fastening member for coupling one end of the steering shaft  
35           hingeably about the shaft;

wherein the steering shaft is buffered and supported with respect to the knuckle cylinder coupled with the chair body, and supported by the rolling bearings during axial rotation and vertical sliding; and

5        wherein the traction cable is connected a to steering shaft via a washer to pull against knuckle cylinder.

6. A wheelchair hub mounted ratchet clutch device, which comprises:

10        ratchet arms;

a shaft ratchet gear (203) formed in a peripheral portion of a flange formed in a middle of a cylindrical shaft member (208) of a length, and provided in a central shaft with one end coupled with a chair body, engaged and disengaged with one of the ratchet arms

15        in response to contact of a cam;

a cylindrical sleeve (210) of a length having one end coupled with a power transmission wheel (140) and a ratchet gear 211 formed around the other end thereof equal to a thread tip circle of the shaft ratchet gear (203), wherein a shaft portion of the ratchet gear is inserted into a hollow portion of the cylindrical sleeve (210), and wherein the ratchet gears are formed rotatable and placed coaxial and adjacent with each other;

20        a hub clutch housing having a cylindrical housing member (215) for coaxially receiving the cylindrical sleeve (210) and the shaft ratchet gear for rotatably supporting both ends and coupling means arranged around the cylindrical housing member (215) for coupling with a hub of a drive wheel;

30        two planar notches formed in intermediate portions of a rod member (221, 222) having a predetermined length and inclined with respect to each other symmetrically about a sectional axis functioning as cam curvature for ratchet arm control;

cam shafts slide in together with two elastic members (224) into holes formed to a depth in the housing member (215);

35        an elastic member for applying a repulsive force to one face of the one ratchet arm which is pivot to a portion of the cylindrical

housing member (215) so that the other face of the one ratchet contacts the cam shaft, wherein the ratchet arm contacts a cylindrical face or a planar portion of the cam shaft according to the sliding position of the cam shaft so that the first ratchet gear selectively performs one-directional rotation stop and bi-directional rotation;

wherein one sides of the two ratchet arms are pivoted, respectively, to portions of the cylindrical housing, and one faces of the ratchet arms are elastically repulsed by the elastic member (218) so that the other faces thereof is in contact with the second cam shaft,

wherein the ratchet arms contact cylindrical faces or planar portions of the second cam shaft according to sliding positions of the cam shaft so that the ratchet gear performs bi-directional rotation stop and bi-directional free rotation, and

wherein the drive wheel and the power transmission wheel cooperate with each other to enable bi-directional rotation, prevent backward driving and allow bi-directional free rotation of the drive wheel.

7. A wheelchair hub mounted ratchet clutch device as recited in claim 6, which comprises:

a ratchet gear (203) formed in a peripheral portion of a flange formed in a middle of a cylindrical shaft member (208) of a predetermined length, and provided in a central shaft, with one end coupled with a chair body;

a cylindrical housing member (215) for receiving the ratchet gear;

a hub clutch housing having a cylindrical housing member (215) for supporting both ends of the ratchet gear to be coaxially hinged and coupling means arranged around the cylindrical housing member (215) for coupling with a hub of a drive wheel;

two planar notches (223) formed in intermediate portions of a rod member having a predetermined length and inclined with respect to each other symmetrically about a sectional axis;

a cam shaft slide in together with two elastic members (224)

into a hole formed to a depth in the housing member;

an elastic member (218) for applying a repulsive force to one face of the one ratchet arm which is pivoted to a portion of the cylindrical housing member (215) so that the other face of the one  
5 ratchet contacts the cam shaft, wherein the ratchet arm contacts a cylindrical face or a planar portion of the cam shaft according to the sliding position of the cam shaft.

8. A wheel chair hub mounted ratchet clutch device as set  
10 forth in claim 6 or 7, which comprises:

a cam holder disk (225) in the form of a hollow circular plate perpendicularly coupled with one ends of the cam shafts;

a hollow member having contact means and a spacing plate (235) and being in contact with a face of the cam holder disk;

15 an axial slot hole formed in one end of a drive shaft;

a cylindrical pin (207) perforated through the hole perpendicularly with the shaft and having both ends projected beyond the shaft diameter;

a traction cable inserted into a hollow hole in an axial center  
20 of a drive shaft and has one end coupled with the cylindrical pin, wherein when the traction cable is pulled, the cylindrical pin presses a spacer plate so that the cam shaft presses the elastic member (224) in an axially movable fashion, and when the traction cable is retracted, the cam shaft is moved reverse by the elastic member (224);  
25 and

a drive wheel hub made of a cylindrical member and provided in an inner peripheral face of a hollow hole at one end with means for receiving the housing and in an outer periphery with means for connecting with an outer wheel of the drive wheel, wherein the drive  
30 wheel is detachably coupled with the hub clutch housing via fastening means (237) to transmit a driving force to the housing, wherein the traction cable is adjusted to select the position of the cam shaft.

9. A wheelchair provided with an auxiliary power source  
35 capable of forward and reverse driving and steering, which

comprises:

a rod member provided at one end with means for coupling with a shaft end and inserted into an axial center of a wheel hub to be coupled with a power transmission device and at the other end with  
5 a ratchet gear to be received in a flange of the wheel hub;

ratchet pivoted to the flange of the wheel hub and arranged at both sides of the ratchet gear;

a rod-shaped cam (710) of a length having a section defined by two arcs of opposite central angles having different sizes and  
10 straight lines connecting between both ends of the arcs, and rotatably supported between the two ratchet arms;

a plurality of elastic members for pressing the ratchet arms toward the cam to produce an elastic repulsive force, wherein the hinged ratchet arms are engaged into or disengaged from thread  
15 sections of the ratchet gears according to the configuration of a contact face of the cam on which the ratchet arms contact so that a ratchet wheel can be connected with and separated from the wheel hub;

a cover (714) having a plurality of holes and coupled with a  
20 flange (706) via a plurality of fastening means (715) for hingeably supporting one ends of rotary shafts such as ratchet shafts (701), cams (710) and the ratchet arms (712); and

means for controlling rotation of the cam, wherein rotation of the drive wheels allows bi-directional disengagement position,  
25 bi-directional engagement position, forward rotational disengagement or engagement, reverse disengagement or engagement with respect to the ratchet shafts.

10. A drum band brake for a wheelchair which brakes rotation  
30 of a drum under a frictional force which is generated when a brake band (503) presses an outer peripheral face of a cylindrical brake drum coupled with a rotary body by pulling a crank lever connected with a cable via operation of a brake handle, in which comprises:

a cylindrical brake drum (501) fixed coaxially to one face of  
35 a power transmission wheel (140) which is coupled with a shaft of

a drive wheel for transmitting rotation of a driving force via a flexible belt;

brackets (506 and 507) coupled with one ends of traction cables (508 and 509) and movable connected with the crank lever via slits;

5 and

separately operative brake handles 511 and 512 adapted for a wheelchair rider and a carer and coupled with the other ends of the traction cables 508 and 590.

Received by the International Bureau on 24 December 2003 (24.12.03);  
Original claim 1 has been amended. Original claim 2 has been deleted. Original claim 6 has been amended.

What Is Claimed Is:

1. (Currently Amended) A wheelchair with at least a pair of  
5 rear drive wheels arranged in left and right chair frame sections  
and a pair of driven wheels arranged in the left and right chair  
frame sections for enabling forward and reverse driving and  
steering of the wheelchair, wherein an improved wheelchair  
including:

10 at least one pair of forced driven caterpillars which have a  
plurality of cylindrical wheels (146, 147 and 148) with rotary  
shafts in their central portions and grooves in their peripheries  
so that at least one flexible belt (149) is wound around the  
wheels, wherein the belt is in contact with the wheels to define  
15 linear sections between adjacent ones of the wheels so that the  
linear sections define a plurality of sides of at least a triangle,  
one of two sides having an obtuse exterior angle there between  
being parallel with the ground side and other one being defined  
the frontmost wheel forms an approach angle with respect to the  
20 ground, and wherein at least one of the wheels is provided means  
being driven by transmitted force, and means for coupling the  
wheels to a front section of the chair frame, thereby readily  
driving over obstacles or depressions on a road;

at least one caster wheel which is provided with control  
25 means of lifting up and down against chair body mounted on the  
front section of the chair body, thereby free steering toward all  
directions,

in which the caster wheel is provided coincidentally with  
the caterpillars so that the caster wheel and the caterpillars  
30 selectively contact the ground to facilitate turning and climbing,  
wherein the caster wheel and the caterpillars alternately support  
a front section of a chair body on the ground.

2. (Cancelled)

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3. An improved wheelchair as recited in claim 1, in which further comprises:

an auxiliary power source for driving the caterpillars which are arranged in the front section of the chair body; and

5 steering means for at least pair of the rear wheels which are arranged in a rear section of the chair body.

4. A foldable wheelchair body frame for use in a seat, in which further comprises:

10 a X-shaped frame structure for an auxiliary wheel which is constituted with two rod members of equal length and coupled each other with hinge means at their middle portions;

two rod members of equal length having hinge means at both ends hinged with each other to define an L-shaped structure and  
15 the other ends are coupled with the hinge means on the X-shaped frame structure between the cross point and ends of the X-shaped frame to provide at least a set of symmetric quadrangular linkages having four sides connected via four joints;

means for coupling the ends of the rod members of the X-shaped frame structure with left and right upper portions of the  
20 body frame rotatably, wherein the other ends of the X-shaped frame structure contact lower portions of the body frame to support the same; and

means for vertically supporting a steering shaft of the  
25 auxiliary wheel on the X cross point and the L crosse point.

5. A wheel chair caster wheel with vertical shaft for steering, in which further comprises:

a knuckle cylinder of an elongated cylinder body for supporting  
30 the caster on a chair body and having a cylindrical elastic member and surrounding the ball-retaining cylinder, wherein the hollow washers contact and support both ends of the elongated cylinder, a ball-retaining cylinder having a cylindrical wall and a plurality of steel balls inserted into the cylindrical wall, both ends of  
35 the ball-retaining cylinder being supported by hollow washers and

rolling bearings, wherein the ball-retaining cylinder is placed around the steering shaft;

a fastening member for coupling one end of the steering shaft hingeably about the shaft;

5 wherein the steering shaft is buffered and supported with respect to the knuckle cylinder coupled with the chair body, and supported by the rolling bearings during axial rotation and vertical sliding; and

10 wherein the traction cable is connected a to steering shaft via a washer to pull against knuckle cylinder.

6. (Currently Amended) A ratchet device which prevents wheelchair drive wheels from rolling rearward on a ramp in order to help the driver move safely in person without carers, wherein  
15 an improved ratchet device including:

a plurality of ratchet arms (217) formed from plate members of a thickness with a round rod;

a shaft ratchet gear (203) formed in a peripheral portion of a flange formed in a middle of a cylindrical shaft member (208) of a  
20 length, and provided in a central shaft with one end coupled with a chair body, engaged and disengaged with plate member of the ratchet arms in response to contact of a cam;

a cylindrical sleeve (210) of a length having one end coupled with a power transmission wheel (140) and a ratchet gear 211  
25 formed around the other end thereof equal to a thread tip circle of the shaft ratchet gear (203) , wherein a shaft portion of the shaft ratchet gear (203) is inserted into a hollow portion of the cylindrical sleeve (210) , and wherein the ratchet gears are formed rotatable and placed coaxial and adjacent with each other;

30 a hub clutch housing having a cylindrical housing member (215) for coaxially receiving the cylindrical sleeve (210) and the shaft ratchet gear for rotatably supporting both ends and coupling means arranged around the cylindrical housing member (215) for coupling with a hub of a drive wheel;

35 two planar notches formed in intermediate portions of a

rod member(221,222) having a predetermined length and inclined with respect to each other symmetrically about a sectional axis functioning as cam curvature for ratchet arm control;

5 cam shafts slide in together with two elastic members (224) into holes formed to a depth in the housing member (215);

an elastic member for applying a repulsive force to one face of the one ratchet arm which is pivot to a portion of the cylindrical housing member (215) so that the other face of the one ratchet contacts the cam shaft, wherein the ratchet arm contacts a  
10 cylindrical face or a planar portion of the cam shaft according to the sliding position of the cam shaft so that the first ratchet gear selectively performs one-directional rotation stop and bi-directional rotation;

wherein one sides of the two ratchet arms are pivoted,  
15 respectively, to portions of the cylindrical housing, and one faces of the ratchet arms are elastically repulsed by the elastic member (218) so that the other faces thereof is in contact with the second cam shaft,

wherein the ratchet arms contact cylindrical faces or  
20 planar portions of the second cam shaft according to sliding positions of the cam shaft so that ratchet gear performs bi-directional rotation stop and bi-directional free rotation, so that the drive wheel and the power transmission wheel(140) cooperate with each other to enable bi-directional rotation, to  
25 prevent backward driving and to allow bi-directional idle rotation of the drive wheel.

7. A wheelchair hub mounted ratchet clutch device as recited in claim 6, which comprises:

30 a ratchet gear (203) formed in a peripheral portion of a flange formed in a middle of a cylindrical shaft member (208) of a predetermined length, and provided in a central shaft, with one end coupled with a chair body;

a cylindrical housing member (215) for receiving the  
35 ratchet gear;

a hub clutch housing having a cylindrical housing member (215) for supporting both ends of the ratchet gear to be coaxially hinged and coupling means arranged around the cylindrical housing member (215) for coupling with a hub of a drive wheel;

5 two planar notches (223) formed in intermediate portions of a rod member having a predetermined length and inclined with respect to each other symmetrically about a sectional axis;

a cam shaft slide in together with two elastic members (224) into a hole formed to a depth in the housing member;

10 an elastic member (218) for applying a repulsive force to one face of the one ratchet arm which is pivoted to a portion of the cylindrical housing member (215) so that the other face of the one ratchet contacts the cam shaft, wherein the ratchet arm contacts a cylindrical face or a planar portion of the cam shaft  
15 according to the sliding position of the cam shaft.

8. A wheel chair hub mounted ratchet clutch device as set forth in claim 6 or 7, which comprises:

a cam holder disk (225) in the form of a hollow circular  
20 plate perpendicularly coupled with one ends of the cam shafts;

a hollow member having contact means and a spacing plate (235) and being in contact with a face of the cam holder disk;

an axial slot hole formed in one end of a drive shaft;

a cylindrical pin (207) perforated through the hole  
25 perpendicularly with the shaft and having both ends projected beyond the shaft diameter;

a traction cable inserted into a hollow hole in an axial center of a drive shaft and has one end coupled with the cylindrical pin, wherein when the traction cable is pulled, the  
30 cylindrical pin presses a spacer plate so that the cam shaft presses the elastic member (224) in an axially movable fashion, and when the traction cable is retracted, the cam shaft is moved reverse by the elastic member (224); and

a drive wheel hub made of a cylindrical member and provided  
35 in an inner peripheral face of a hollow hole at one end with means

for receiving the housing and in an outer periphery with means for connecting with an outer wheel of the drive wheel,, wherein the drive wheel is detachably coupled with the hub clutch housing via fastening means (237) to transmit a driving force to the housing, wherein the traction cable is adjusted to select the position of the cam shaft.

9. A wheelchair provided with an auxiliary power source capable of forward and reverse driving and steering, which comprises:

a rod member provided at one end with means for coupling with a shaft end and inserted into an axial center of a wheel hub to be coupled with a power transmission device and at the other end with a ratchet gear to be received in a flange of the wheel hub;

ratchet pivoted to the flange of the wheel hub and arranged at both sides of the ratchet gear;

a rod-shaped cam (710) of a length having a section defined by two arcs of opposite central angles having different sizes and straight lines connecting between both ends of arcs, and rotatably supported between the two ratchet arms;

a plurality of elastic members for pressing the ratchet arms toward the cam to produce an elastic repulsive force, wherein the hinged ratchet arms are engaged into or disengaged from thread sections of the ratchet gears according to the configuration of a contact face of the cam on which the ratchet arms contact so that a ratchet wheel can be connected with and separated from the wheel hub;

a cover (714) having a plurality of holes and coupled with a flange (706) via a plurality of fastening means (715) for hingeably supporting one ends of rotary shafts such as ratchet shafts (701), cams (710) and the ratchet arms (712); and

means for controlling rotation of the cam, wherein rotation of the drive wheels allows bi-directional disengagement position, bi-directional engagement position, forward rotational

disengagement or engagement, reverse disengagement or engagement with respect to the ratchet shafts.

5 10. A drum band brake for a wheelchair which brakes rotation of a drum under a frictional force which is generated when a brake band (503) presses an outer peripheral face of a cylindrical brake drum coupled with a rotary body by pulling a crank lever connected with a cable via operation of a brake handle, in which comprises:

10 a cylindrical brake drum (501) fixed coaxially to one face of a power transmission wheel (140) which is coupled with a shaft of a drive wheel for transmitting rotation of a driving force via a flexible belt;

15 brackets (506 and 507) coupled with one ends of traction cables (508 and 509) and movable connected with the crank lever via slits; and

separately operative brake handles 511 and 512 adapted for a wheelchair rider and a carer and coupled with the other ends of the traction cables 508 and 509.

**STATEMENT UNDER PCT ARTICLE 19**

Claim 1 has been amended herein to merge partially claim 2 and the originally claim 2 is deleted.

Claim 6 has been amended to be more definite after reviewing the documents cited in the International Search Report.

The purpose of these amendments is to limit the scope of the claimed invention compared with the documents cited in the International Search Report.